

## REACTION FLASK ANALYSIS OF THE ASYMMETRIC HYDROGENATION OF ARTEMISINIC ACID

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There is currently a search for a reliable, low cost, synthetic or semi-synthetic method of production for artemisinin – a potent antimalarial drug with limited natural supply. Synthesis of artemisinin from artemisinic acid can be broken down into two key steps: the asymmetric hydrogenation of AA to dihydroartemisinic acid (DHAA) and the oxidation and complex rearrangement of DHAA to form artemisinin. This work reports the reaction flask analysis of the stereospecific conversion of AA to DHAA using chirped-pulse Fourier transform microwave spectroscopy (CP-FTMW). Successful monitoring of this reaction requires resolution of multiple species: artemisinic acid (AA), (R,R)-dihydroartemisinic acid (DHAA), (R,S)-dihydroartemisinic acid (epiDHAA), and the over-reduced form tetrahydroartemisinic acid (THAA). The rotational spectra of these compounds have been obtained through measurements on purified samples with quantities in the 20-100 mg level. For two species (AA and (R,R)-DHAA) the broadband rotational spectrum had 13C-level sensitivity permitting a carbon framework structure determination. For the analysis of the reaction mixture a 70 mg sample was provided. We were able to identify all species in the reaction mixture without further purification. Using dipole moments from quantum chemistry, the relative abundance of each species in the reaction mixture was determined: 14.85% AA, 57.28% DHAA, 9.19% epiDHAA, and 18.67% THAA.